REMARKS

Claims 1-20 are pending in the application. By this Amendment, new claims 21-23 have been added in order to provide for a more adequate basis for protection of the invention.

In the Office Action it is noted that claims 1-20 are rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,191,408 to Shinotsuka et al. ("Shinotsuka") in view of U.S. Patent No. 6,133,862 to Dhuse et al. ("Dhuse").

Rejection under 35 U.S.C. § 103(a)

The rejection of claims 1-20 under 35 U.S.C. § 103(a) over Shinotsuka in view of Dhuse is respectfully traversed based on the following.

Claims 1-20 include independent claims 1, 15, and 16, wherein claims 2-14 depend, directly or indirectly from claim 1, and claims 17-20 depend, directly or indirectly, form claim 16.

Independent claim 1 recites a first and second pixel, wherein the second pixel generates "a compensation signal with which to compensate the output signal of the first pixel...." Independent claim 15 also recites a first and second pixel, wherein the second pixel generates "a compensation signal with which to compensate the output signal of the first pixel...." Independent claim 16 recites a first and second pixel, wherein the second pixel "is used for reducing noise that is caused by the first pixel...."

Shinotsuka relates to a photosensor processing apparatus 5 for receiving output voltages Vo from respective photosensors 4 of an image sensor 1. The apparatus 5 is designed to correct for variations in sensor output voltages Vo among the photosensors 4 that contribute to fixed-pattern noise (FPN).[1] The apparatus 5 includes a correcting device 6. As shown in Fig. 5, the correcting device 6 comprises an inflection point data storage device 7, which is a memory such as a ROM for storing a set of data V_A about

respective inflection points of the photosensors 4.[2] The correcting device 6 also includes a reference inflection point data setting device 9, which is a memory such as a RAM for storing respective reference inflection point data that is input in advance from a data input device, such as a keyboard (reference inflection point input device 11).[3] The correcting device 6 further comprises a data comparator 8 and a calculation device 10.

Dhuse relates to an apparatus for reducing reset noise in photodiode-based sensors. Dhuse indicates that two causes of reset noise are "fluctuations in the level of Vcc and switching noise in the operation of transistor M1...."[4] Dhuse takes the approach of adding a "reference pixel" for determining and allowing for the correction of the fluctuation in the level of Vcc coming from the voltage source.[5] As can be seen by comparing Dhuse Figs. 2 and 4, wherein Fig. 2 shows a circuit for a MOS image-sensing pixel 200 and Fig. 4 shows a circuit for the reference pixel 400, the reference pixel 400 is a slight modification of the MOS image-sensing pixel 200. The basic difference, as can be seen by comparing Figs. 2 and 4, is that the reference pixel 400 has a capacitor 418 in place of a photodiode PD1 that is used in the MOS image-sensing pixel 200.

In setting forth the present rejection, the Office Action states that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the correction circuitry **6** of Shinotsuka in the form of a pixel...." However, it is respectfully pointed out that both Shinotsuka and Dhuse fail to teach a pixel that includes a ROM, a RAM with an input from a keyboard or the like, a comparator, and a calculation device so as to make the proposed combination obvious to one of ordinary skill in the art at the time of the present invention. As mentioned above, the reference pixel disclosed in Dhuse is a relatively minor modification of a MOS image-sensing pixel, where a photo-diode has been replaced with a capacitor. This simple modification disclosed by Dhuse is insufficient for teaching to one of ordinary skill in the art, at the time of the invention, how to incorporate all of the elements of the Shinotsuka correcting device 6 into a pixel such as

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[1] Shinotsuka, col. 2, lines 11-21.
[2] *Id.* at col. 7, lines 1-4.
[3] *Id.* at lines 19-22 and 54-57.
[4] Dhuse, col. 5, lines 10-13.
[5] *Id.* at col. 6, lines 1-5.

the reference pixel 400 of Dhuse. It has been established that "[o]bviousness cannot be proved ...without explaining how references would teach ...[the] combination of elements in [the] patent ...."[6]

Dhuse even advises that "[i]t is ...desirable to have a method and apparatus ...using current pixel designs to achieve improved sensitivity and noise performance using electrical circuitry available with standard MOS fabrication processes."[7] While it seems reasonable to replace a diode with a capacitor in a MOS device using pixel designs at the time of the invention and standard MOS fabrication processes as is done in Dhuse, it is unreasonable to suggest that Shinotsuka and Dhuse teach implementing the Shinotsuka correcting circuit 6 into a known pixel design using some standard MOS fabrication process. Thus, Dhuse explicitly discourages, rather than motivates, the proposed combination of Shinotsuka and Dhuse.

In addition, it is maintained that the function of the reference pixel 400 disclosed in Dhuse is not the same as the function of the Shinotsuka correcting device 6. The Dhuse reference pixel 400 is for "determin[ing] the amount of noise on the power supply voltage, labeled Vcc..."[8] and "removing the row reset noise that is caused by supply voltage variations...."[9] On the other hand, the Shinotsuka correcting device 6 is for "correct[ing] [for] variations in characteristics between pixels of an image sensor...."[10] that contribute to fixed-pattern noise (FPN). There is no evidence to support an allegation that one of ordinary skill in the art, given these two references that each disclose correcting for different sources of noise using different methods and different apparatuses, would be motivated to combine these references in the drastic way suggested in the present Office Action.

Nevertheless, the present Office Action states that the combination would be obvious "in order to consolidate the compensation and output signal elements rather than

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[6] *Aero Industries v. John Donovan Enterprises – Florida Inc.,* 53 USPQ2d 1547, 1557 (DC Sind. 1999).
[7] Dhuse, col. 2, lines 30-33.
[8] *Id.*
[9] *Id.* at col. 6, lines 12-13.
[10] Shinotsuka, col. 2, line 14.

separating them, which would require more space."[11] The Office Action also states that "by designating separate, second pixels to obtain a correction signal value, the correction signals applied to the first pixels would not be biased by problems inherent to the first output signal pixels."[12]

In response, it is first respectfully pointed out that there is no teaching in Shinotsuke or Dhuse related to either of the above statements cited from the Office Action. For example, it is unclear how, based on the teachings of Shinotsuka in view of Dhuse and the knowledge available to one of ordinary skill in the art at the time of the present invention, the proposed combination of Shinotsuke and Dhuse would result in a consolidated, smaller device when Dhuse provides no teaching related to shrinking and/or consolidating the correcting circuit 6 of Shinotsuke that functions to correct for variations in pixel characteristics between pixels of an image sensor.

It is further altogether unclear how, based on the teachings of Shinotsuka in view of Dhuse and the knowledge available to one of ordinary skill in the art at the time of the present invention, the proposed combination would result in some device wherein "the correction signals applied to the first pixels would not be biased by problems inherent to the first output signal pixels." It is also respectfully pointed out that this could not be considered a motivating factor for combining Shinotsuka and Dhuse, since the Shinotsuka correcting device 6 already receives correction signals J_I, which are not biased by problems inherent to a pixel, from the reference inflection point input device 11.

Thus, for all of the reasons discussed above, there exists no suggestion or motivation, in the references or in the knowledge generally available to one of ordinary skill in the art, to combine Shinotsuka and Dhuse. Accordingly, the proposed combination of Shinotsuke and Dhuse cannot render obvious claims 1-20.

Therefore, it is respectfully requested that the rejection of claims 1-20 under 35 U.S.C. § 103(a) over Shinotsuka in view of Dhuse be reconsidered and withdrawn.

[11] Office Action, page 4, lines 10-11 (March 7, 2003).
[12] *Id.* at lines 11-13.

New Claims

By this Amendment, new claims 21-23 have been added in order to provide for a more adequate basis for protection of the invention. Claim 21 is an independent claim, and claims 22 and 23 depend from claim 21.

Claim 21 recites:

> A solid-state image sensing device comprising:
> a first pixel including a photoelectric conversion element and capable of generating an output signal that is logarithmically proportional to an amount of light incident on the photoelectric conversion element;
> a reading circuit for reading out the output signal of the first pixel; and
> a second pixel for generating a compensation signal with which to compensate for a variation ascribable to a characteristic of the reading circuit.

As mentioned above, Shinotsuka relates to a photosensor processing apparatus 5 which is designed to correct for variations in sensor output voltages Vo among photosensors 4 that contribute to fixed-pattern noise (FPN). Dhuse relates to an apparatus comprising a "reference pixel" for determining and allowing for the correction of a fluctuation in the level of Vcc coming from a voltage source. However, both Shinotsuka and Dhuse fail to provide a pixel for compensating for a variation occurring in a reading circuit for reading the output of a first pixel. Thus, it is respectfully submitted that claim 21 patentably distinguishes over Shinotsuka and Dhuse. Since claims 22 and 23 depend from claim 21, claims 22 and 23 are likewise considered to patentably distinguish over Shinotsuka and Dhuse.

CONCLUSION

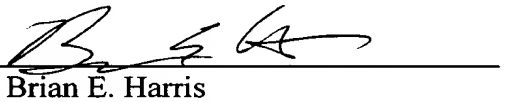
In view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment increases the number of independent claims by one from three to four and increases the total number of claims by three from twenty to twenty-three, but does not present any multiple dependency claims. Accordingly, a Response Transmittal and Fee Authorization form authorizing the amount of $138.00 to be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260 is enclosed herewith in duplicate. However, if the Response Transmittal and Fee Authorization form is missing, insufficient, or otherwise inadequate, or if a fee, other than the issue fee, is required during the pendency of this application, please charge such fee to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.

Any fee required for such Petition for Extension of Time, and any other fee required by this document, other than the issue fee, and not submitted herewith, should be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260. Any refund should be credited to the same account.

Respectfully submitted,

By: 

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